

FIG. 1

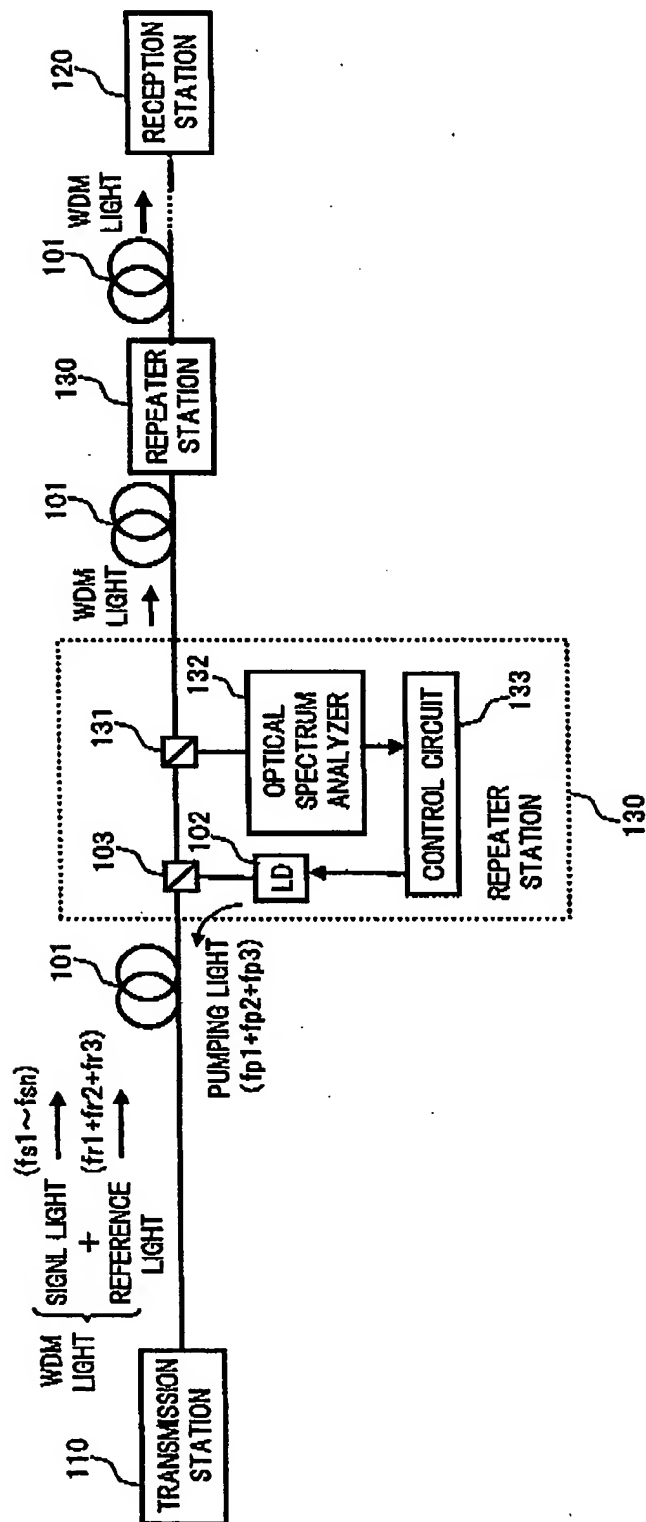
BLOCK DIAGRAM OF OPTICAL TRANSMISSION SYSTEM
ACCORDING TO EMBODIMENT 1-1 OF PRESENT INVENTION

FIG.2

DIAGRAM EXPLAINING ARRANGING METHOD OF REFERENCE LIGHT

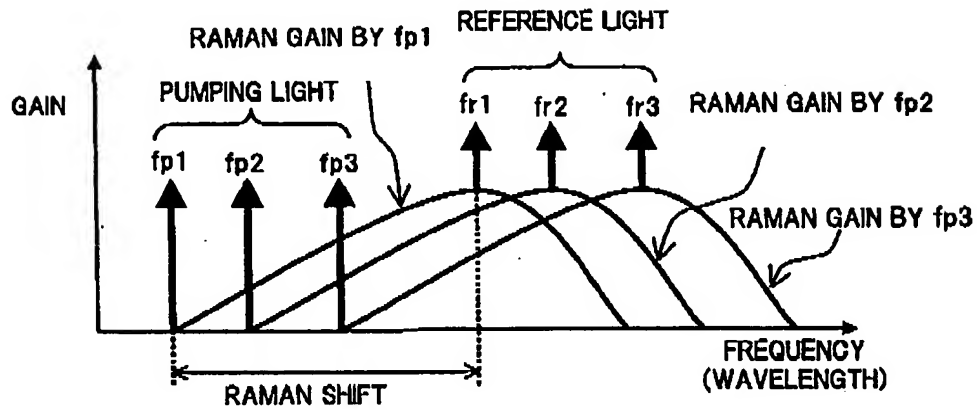


FIG.3

BLOCK DIAGRAM OF TRANSMISSION STATION

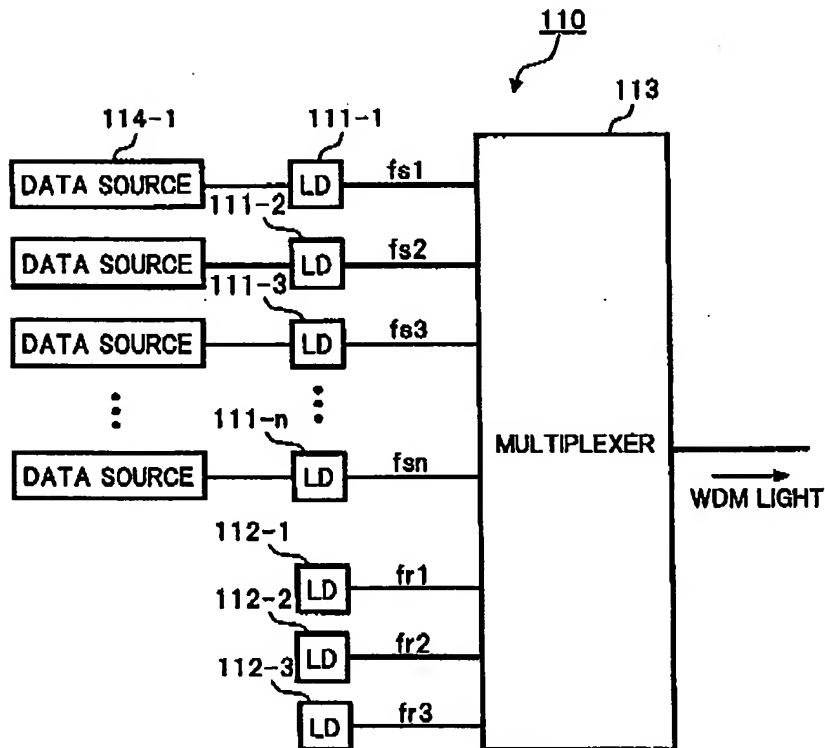


FIG. 4

EXAMPLE OF TRANSMISSION CIRCUIT IN CASE WHERE DATA IS TRANSMITTED UTILIZING REFERENCE LIGHT

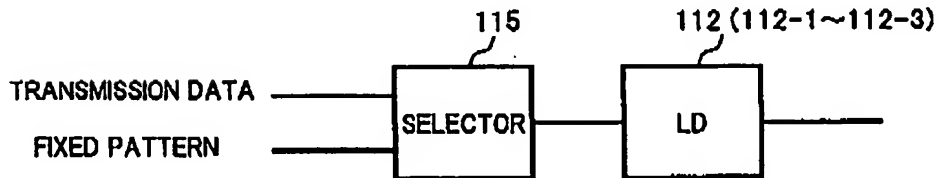
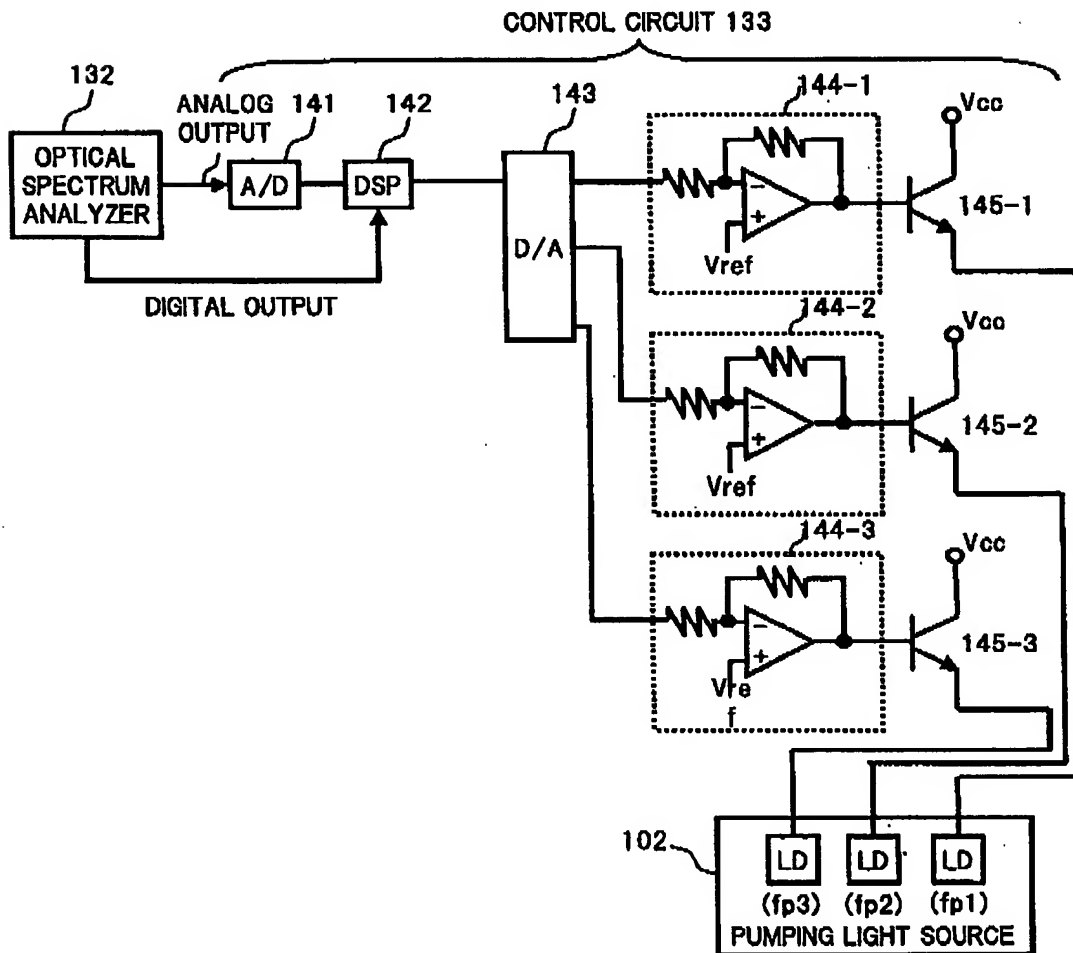


FIG. 5

BLOCK DIAGRAM OF CONTROL CIRCUIT PROVIDED IN EACH REPEATER STATION



GAIN

PUMPING LIGHT

SIGNAL BAND OF WDM LIGHT

fp1 ~ fp3: PUMPING LIGHT
fr1 ~ fr3: REFERENCE LIGHT
fs1 ~ fs4: SIGNAL LIGHT

fr1 **fr2** **fr3**

fs1 ~ fs4

FREQUENCY (WAVELENGTH)

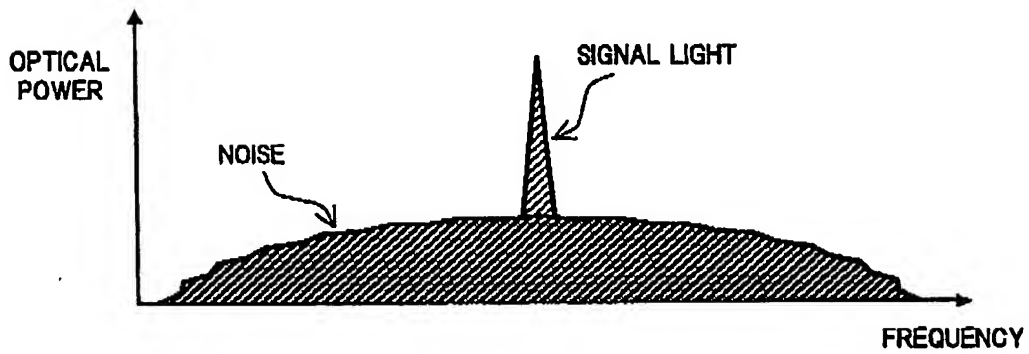
The diagram illustrates a WDM optical transmission system. WDM LIGHT enters from the left, passes through a coupler 103, and then through an ATT (Attenuator) 153. The output of the ATT 153 is WDM LIGHT that passes through another coupler 131. The coupler 103 is also connected to a LD (Laser Diode) 102, which provides PUMPING LIGHT. The LD 102 is connected to an EQUALIZATION CONTROL block 151. The EQUALIZATION CONTROL block 151 is part of a larger CONTROL CIRCUIT 152. The CONTROL CIRCUIT 152 also includes an ALC (Automatic Level Control) block. The ALC block is connected to the EQUALIZATION CONTROL block 151. The CONTROL CIRCUIT 152 is connected to an OPTICAL SPECTRUM ANALYZER 132. The OPTICAL SPECTRUM ANALYZER 132 provides feedback signals Pr1(fr1), Pr2(fr2), and Pr3(fr3) to the EQUALIZATION CONTROL block 151. The entire system is labeled 133.

5/28

FIG.8

(a)

OPTICAL DETECTION IN CONVENTIONAL TECHNIQUE



(b)

DIAGRAM EXPLAINING OPTICAL DETECTION IN EMBODIMENT 1-1

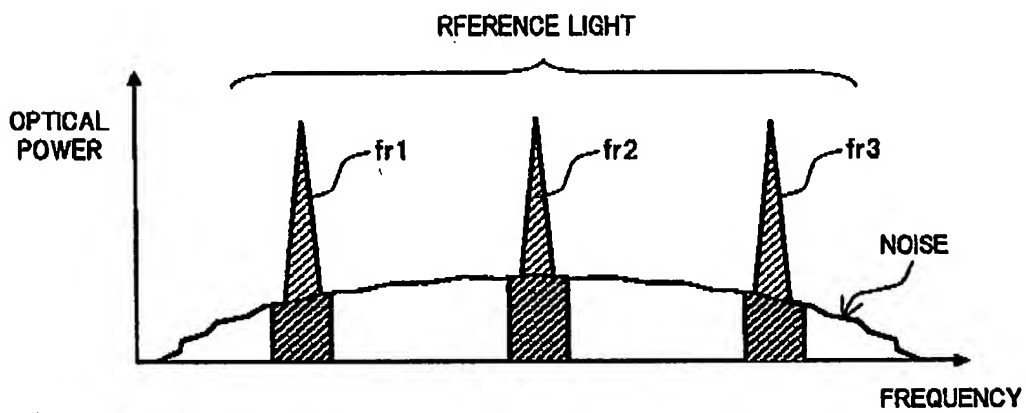


FIG.9

BLOCK DIAGRAM OF REPEATER STATION OF OPTICAL TRANSMISSION SYSTEM
ACCORDING TO EMBODIMENT 1-2

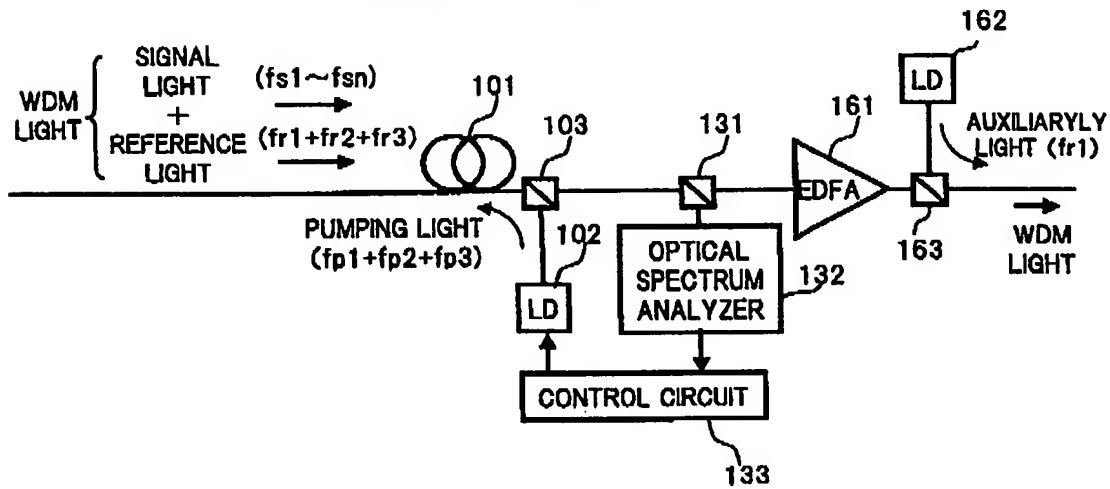


FIG.10

DIAGRAM EXPLAINING RELATION BETWEEN RAMAN AMPLIFIER AND EDFA

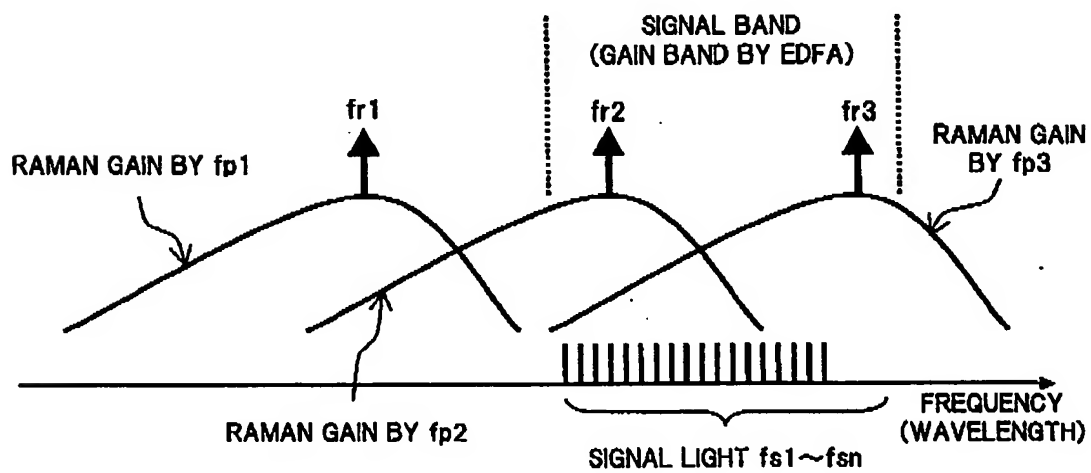


FIG. 11

EMBODIMENT OF APPARATUS FOR DETECTING OPTICAL POWER OF REFERENCE LIGHT

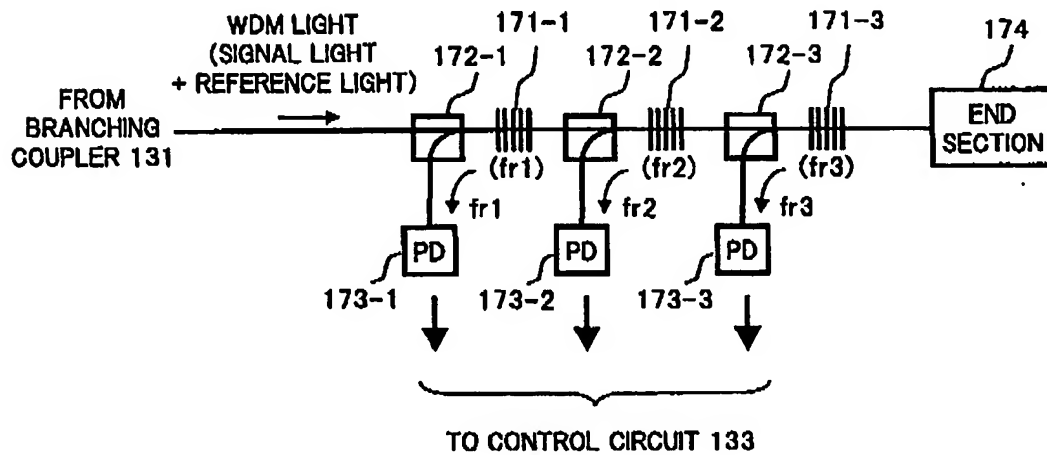


FIG. 12

MODIFIED EXAMPLE OF DETECTING CIRCUIT SHOWN IN FIG. 11

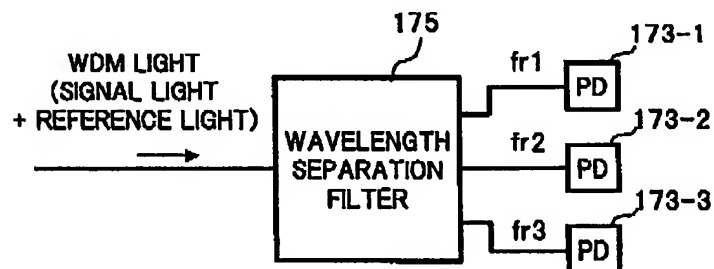
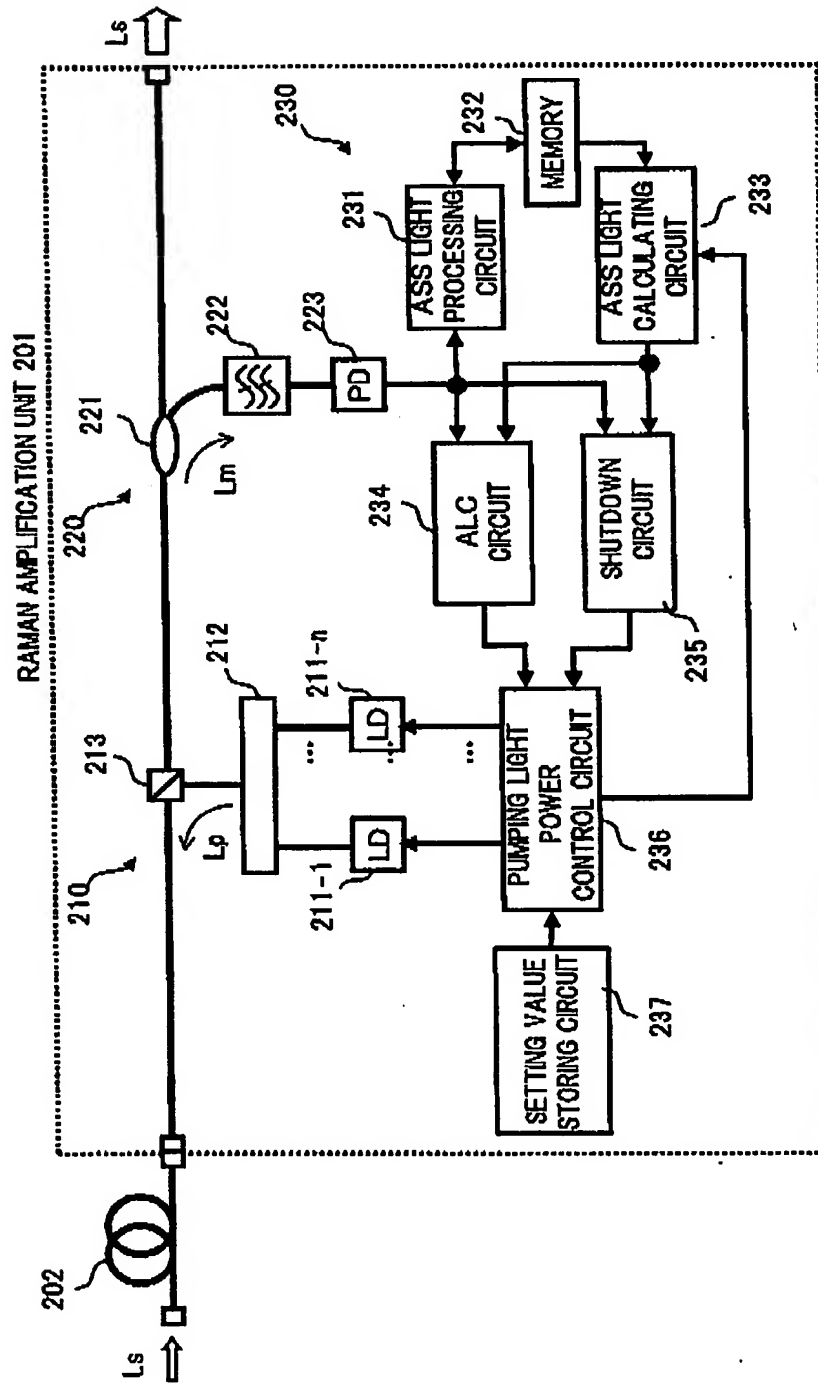


FIG. 13

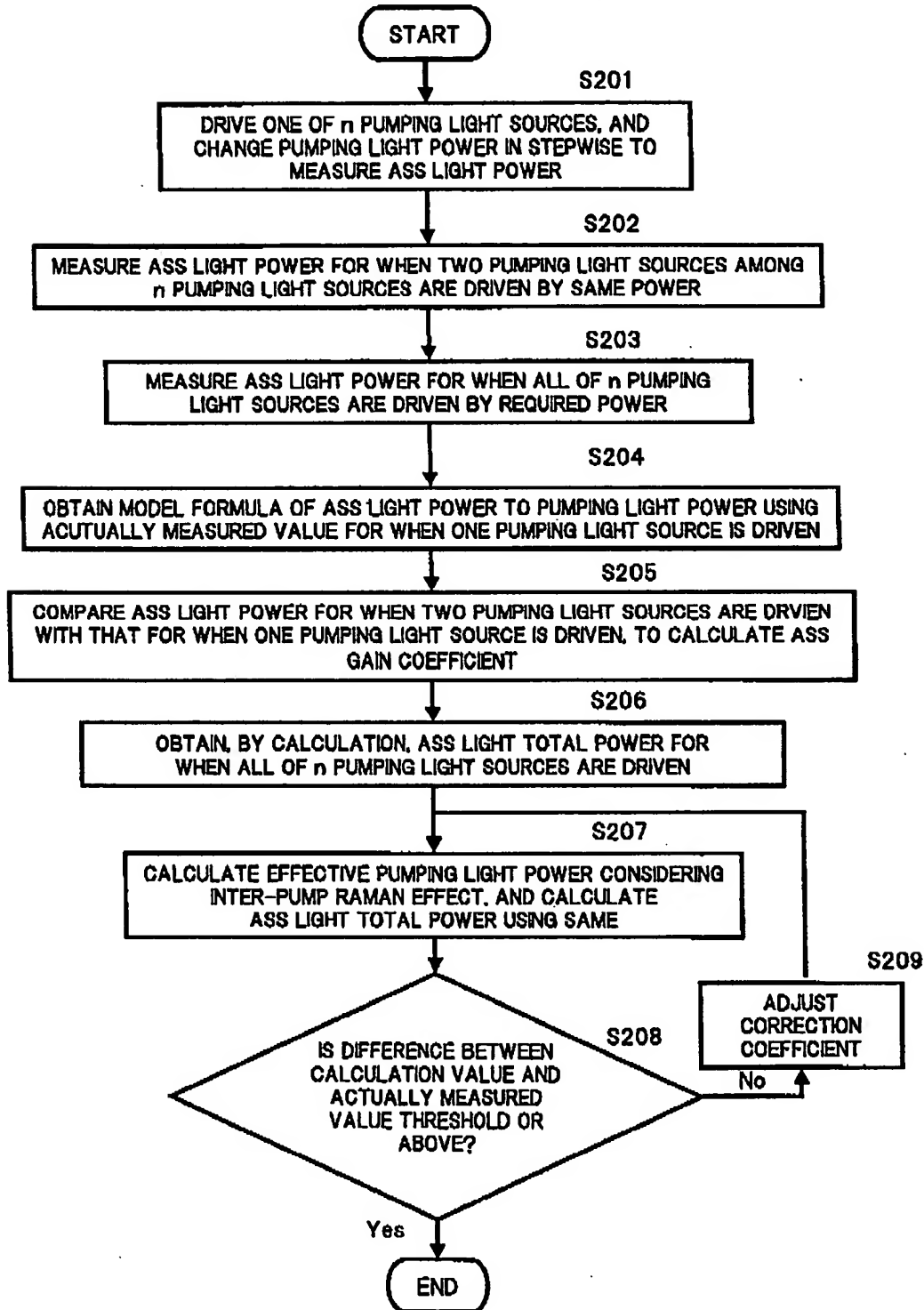
CONFIGURATION OF EMBODIMENT 2-1 OF PRESENT INVENTION



9/28

FIG. 14

PROCESSING OF OBTAINING COEFFICIENT OF MODEL FORMULA
FOR CALCULATING ASS LIGHT POWER



10/28

FIG.15

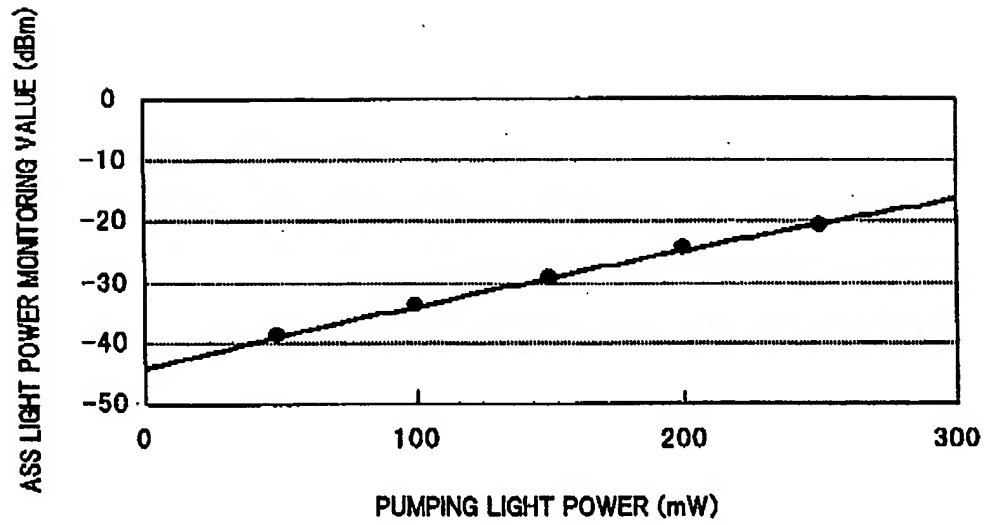


FIG.16

CONSTITUTION OF EMBODIMENT 2-2 OF PRESENT INVENTION

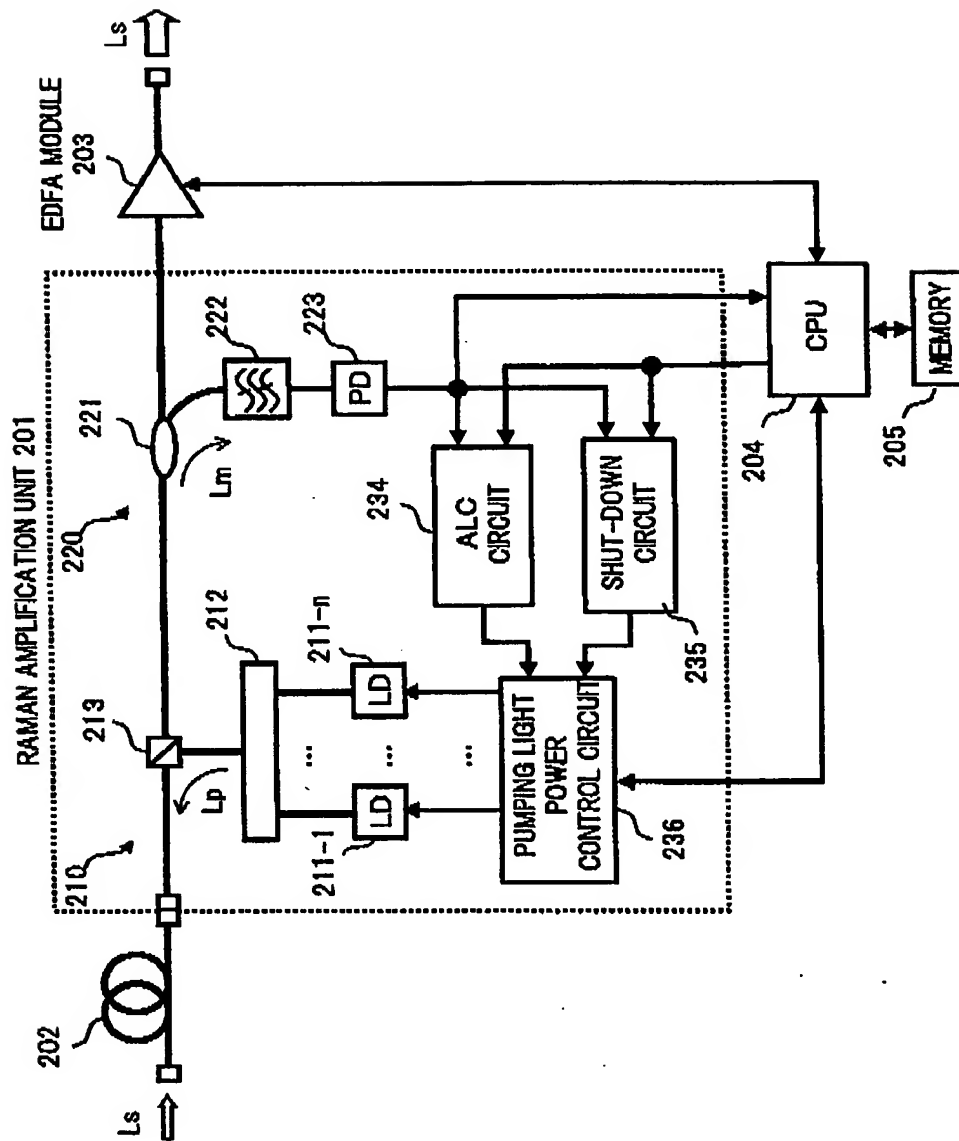


FIG.17

CONFIGURATION OF EMBODIMENT 2-3 OF PRESENT INVENTION

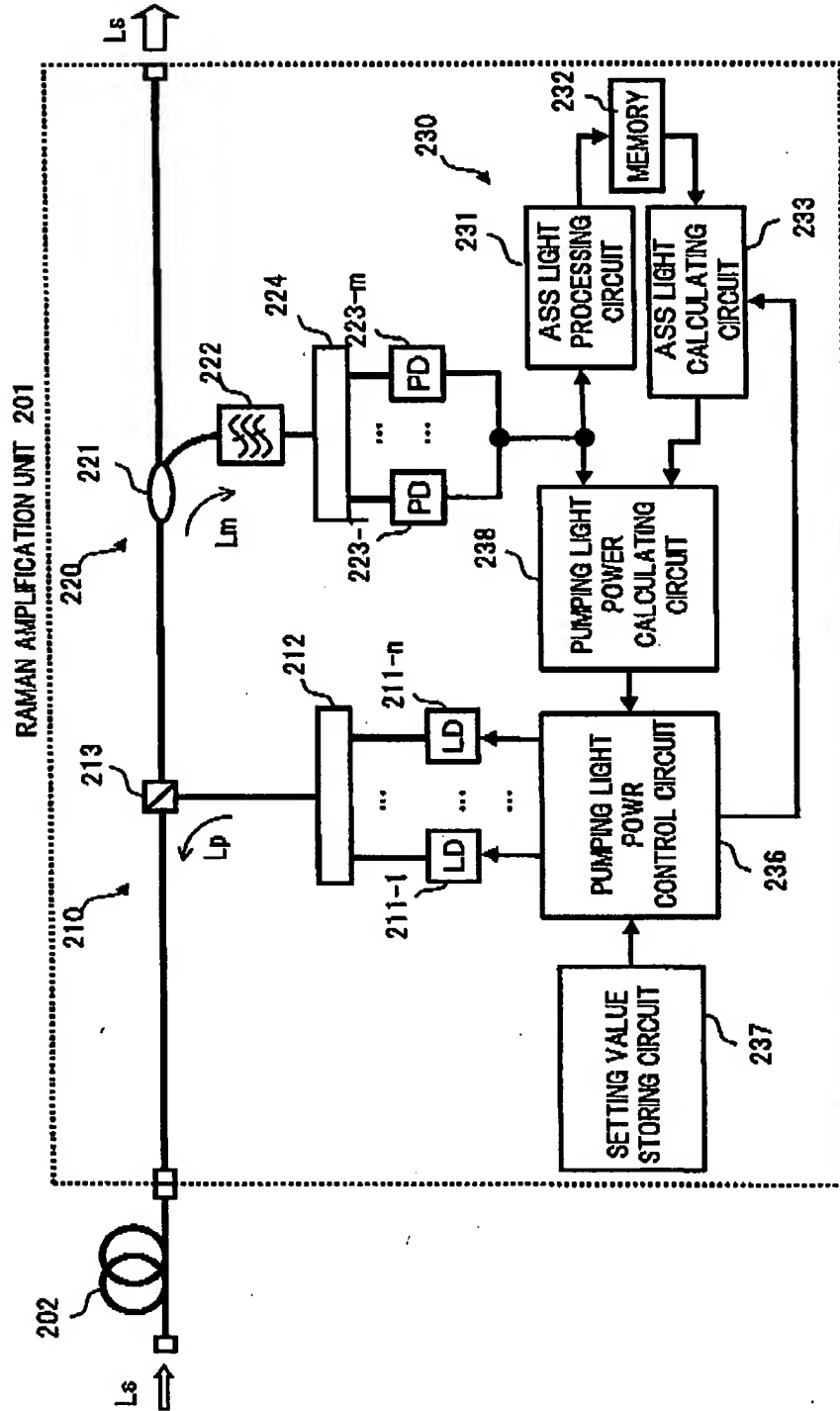


FIG. 18

PROCESSING OF OBTAINING SETTING VALUE OF PUMPING LIGHT POWER FOR
OBTAINING OUTPUT SIGNAL LIGHT WITH DESIRED WAVELENGTH CHARACTERISTIC

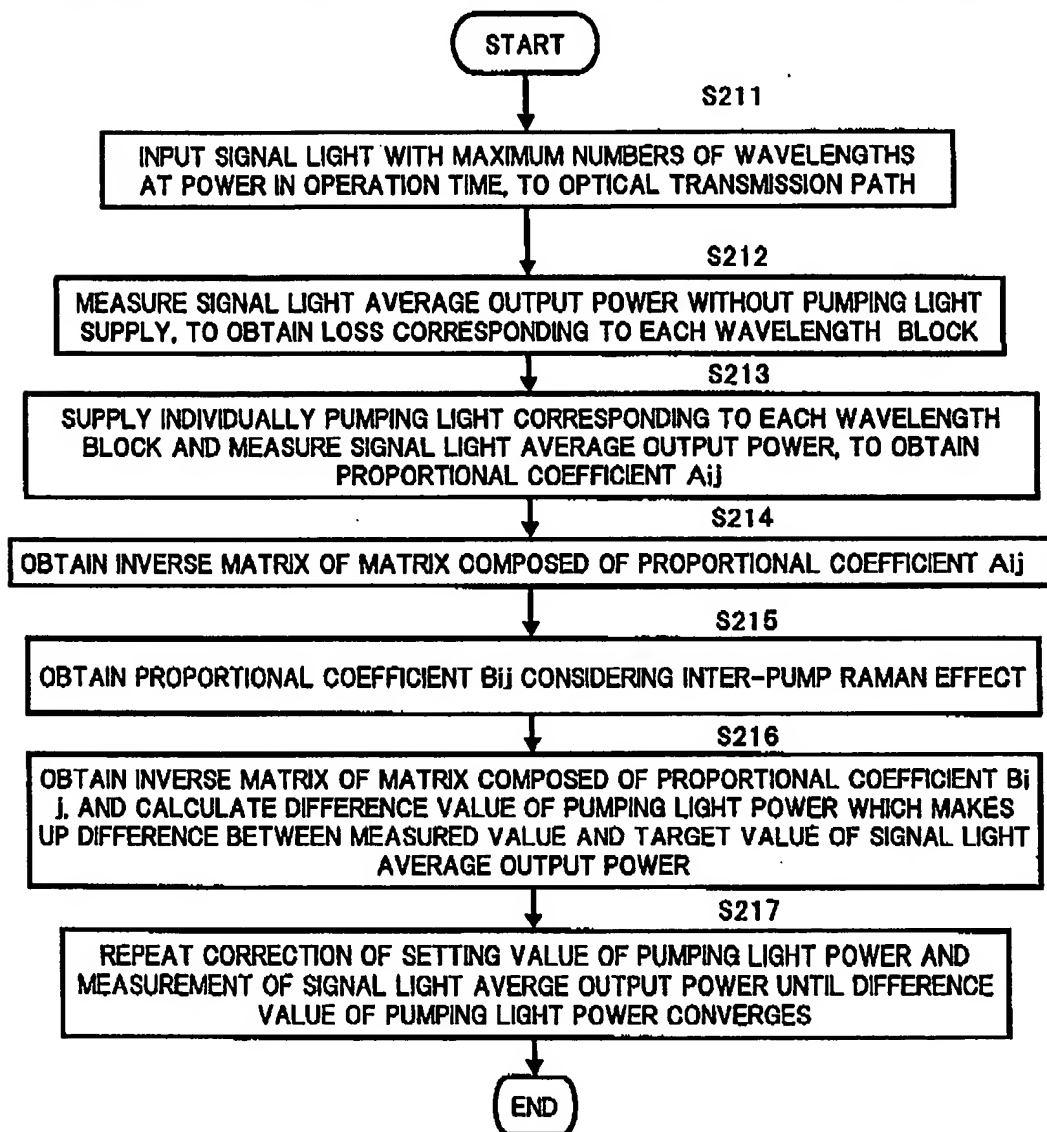


FIG. 19

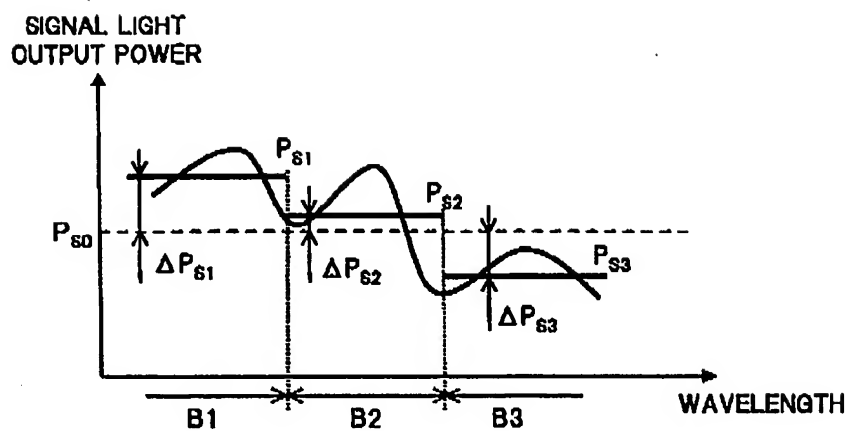


FIG. 20

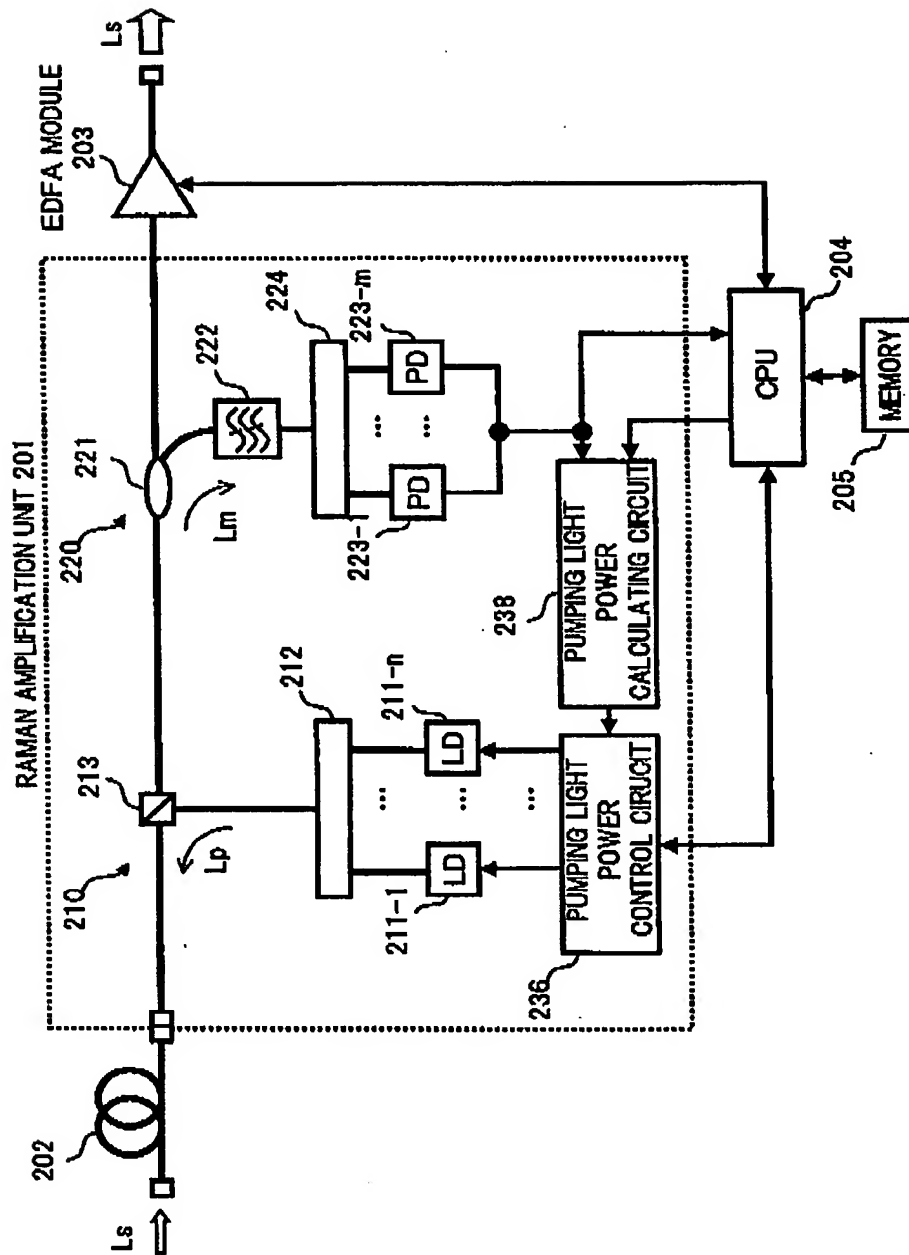


FIG.21

CONFIGURATION OF EMBODIMENT 2-4 OF PRESENT INVENTION

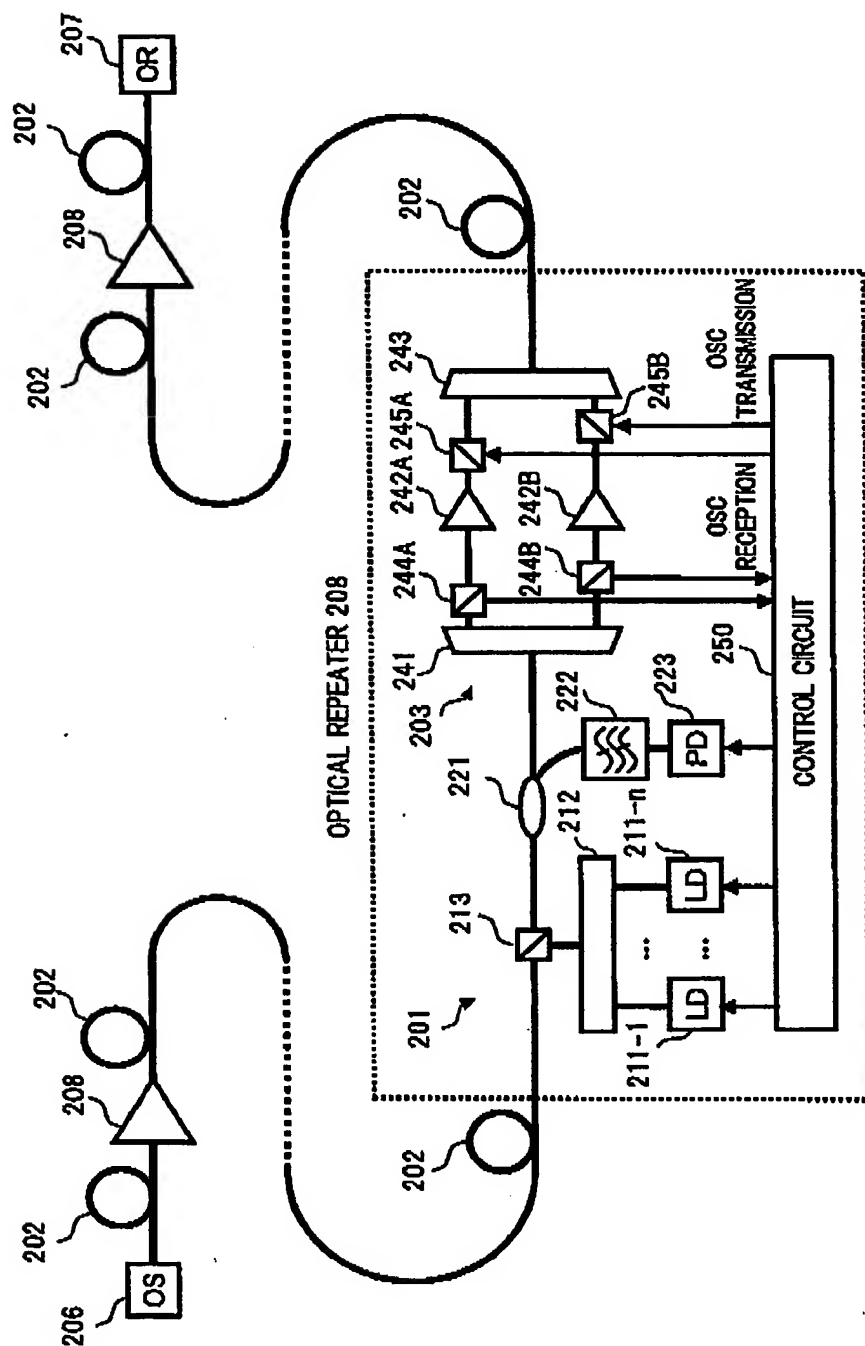


FIG.22

BASIC CONFIGURATION OF EMBODIMENT 3 OF PRESENT INVENTION

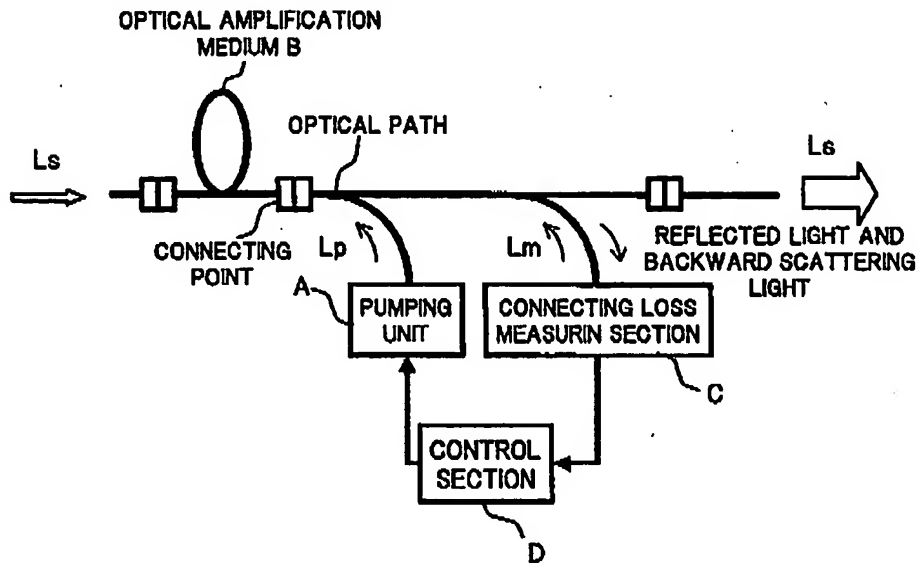


FIG.23

CONFIGURATION OF EMBODIMENT 3-1 OF PRESENT INVENTION

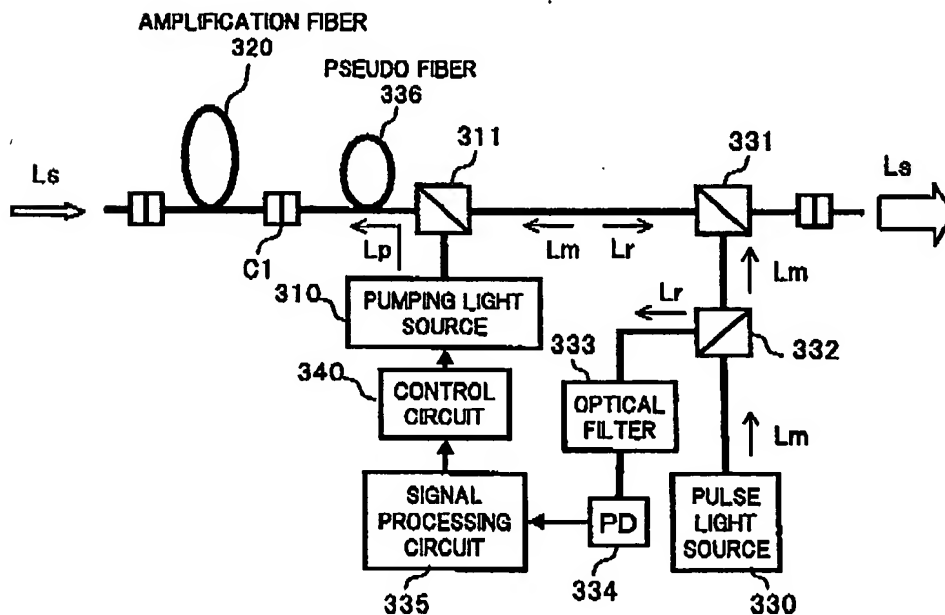


FIG.24

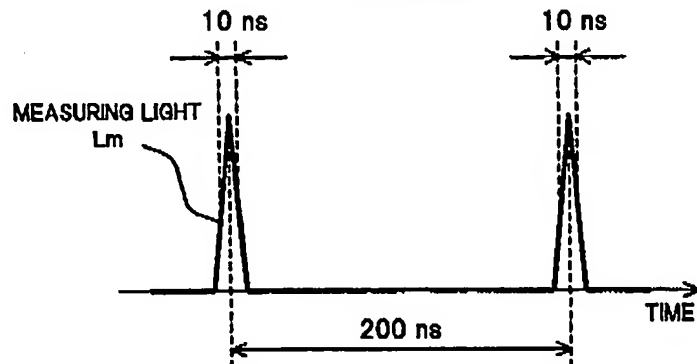


FIG.25

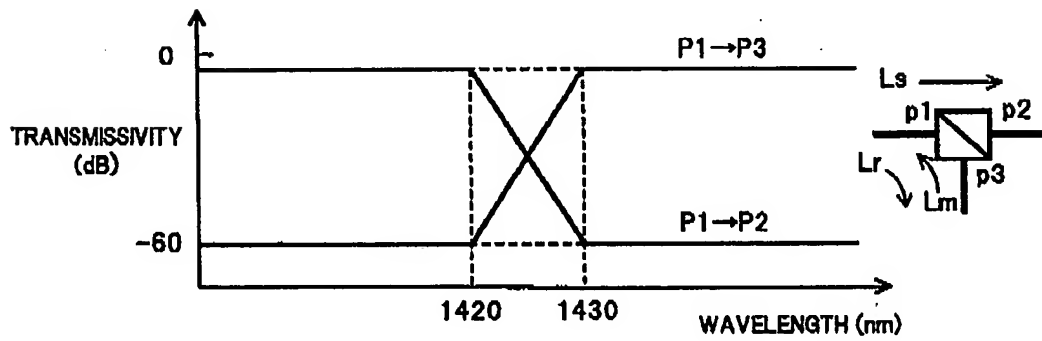


FIG. 26

TYPICAL OTDR MEASURING SYSTEM

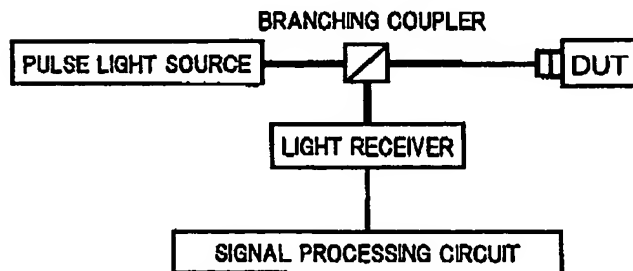
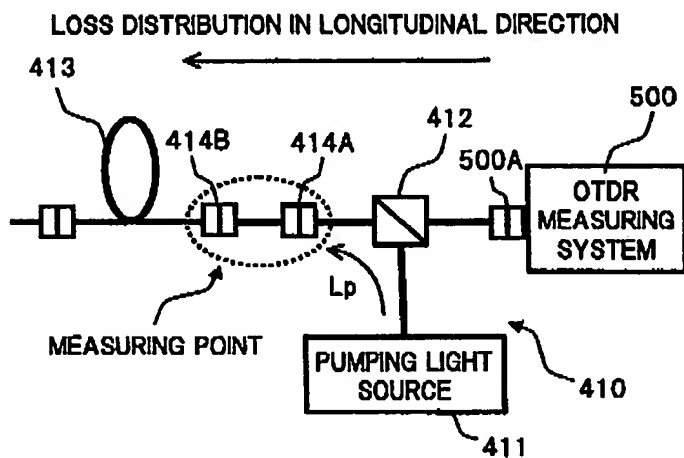


FIG.27

APPLICATION EXAMPLE OF OTDR MEASURING SYSTEM

(A)



(B)

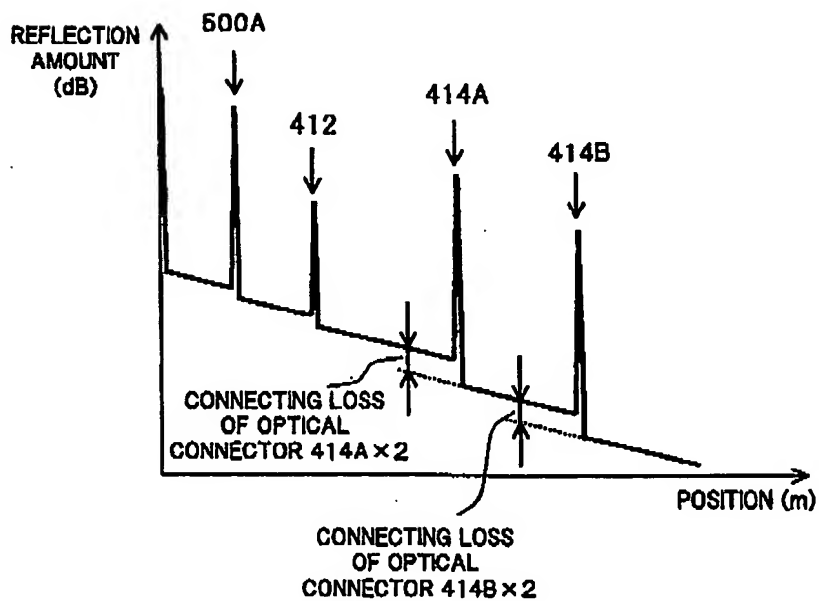


FIG.28

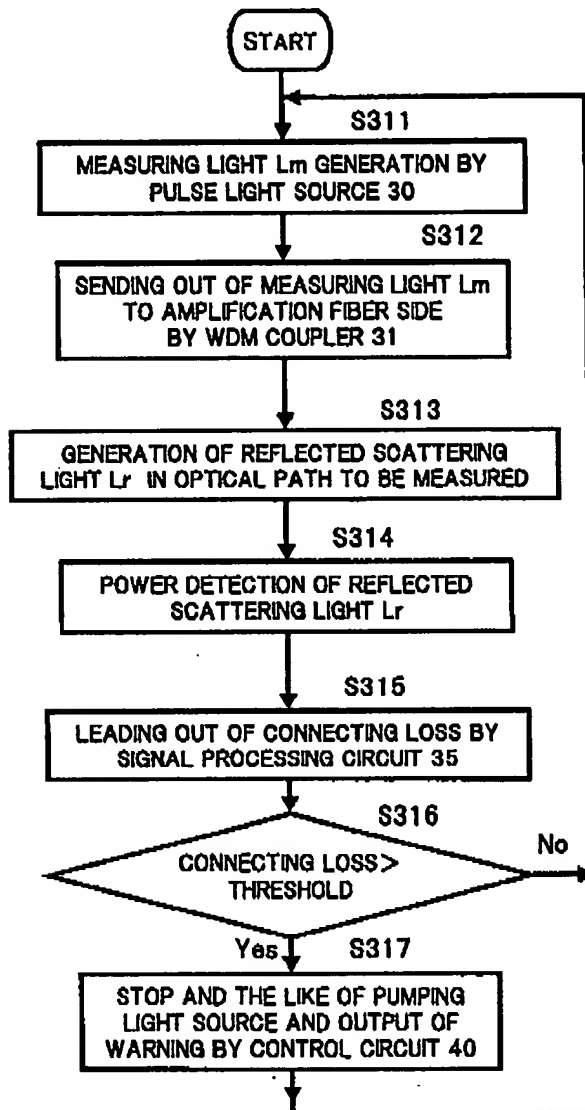


FIG.29

CONFIGURATION OF EMBODIMENT 3-2 OF PRESENT INVENTION

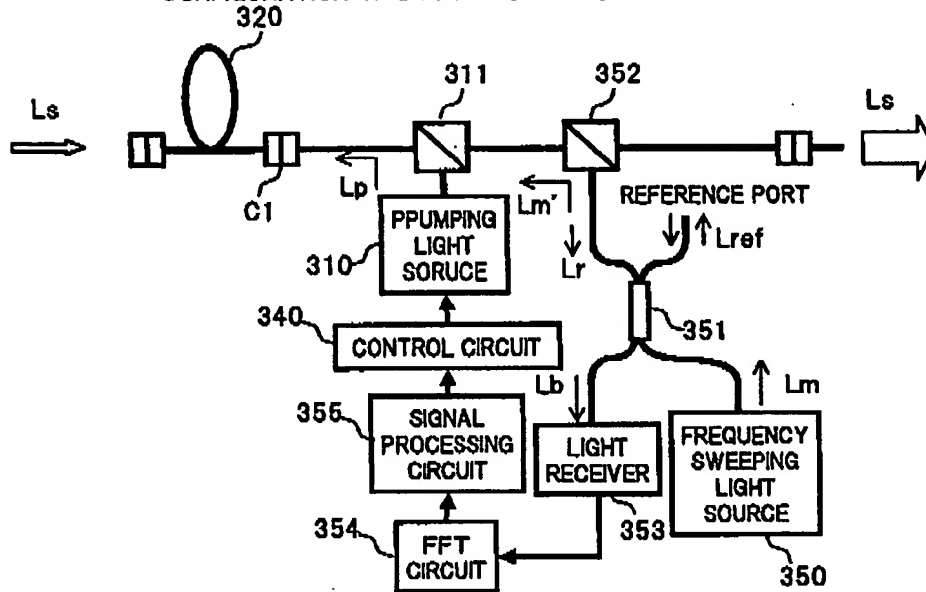


FIG.30

TYPICAL OFDR MEASURING SYSTEM

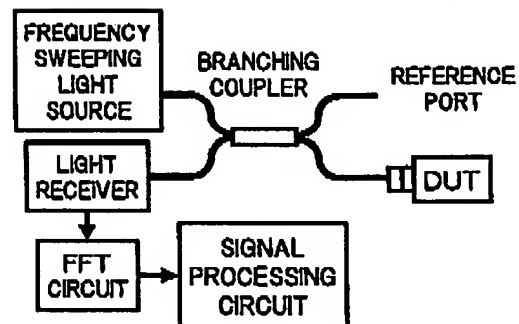


FIG.31

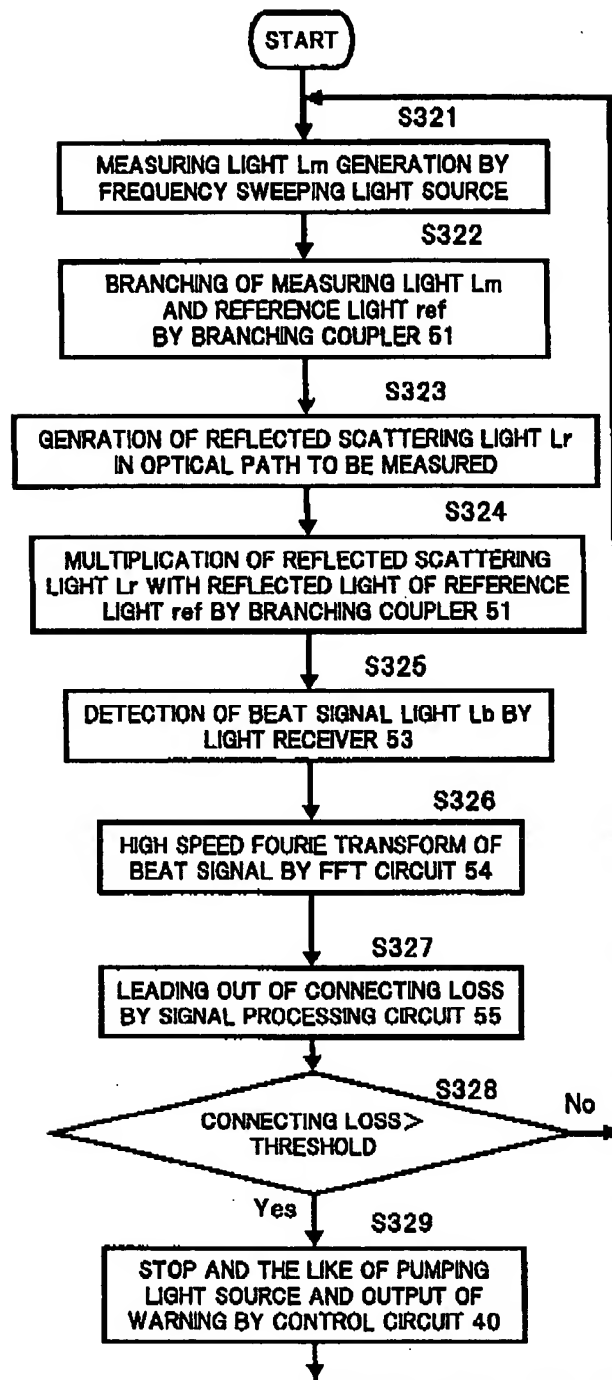


FIG.32

CONFIGURATION OF EMBODIMENT 3-3 OF PRESENT INVENTION

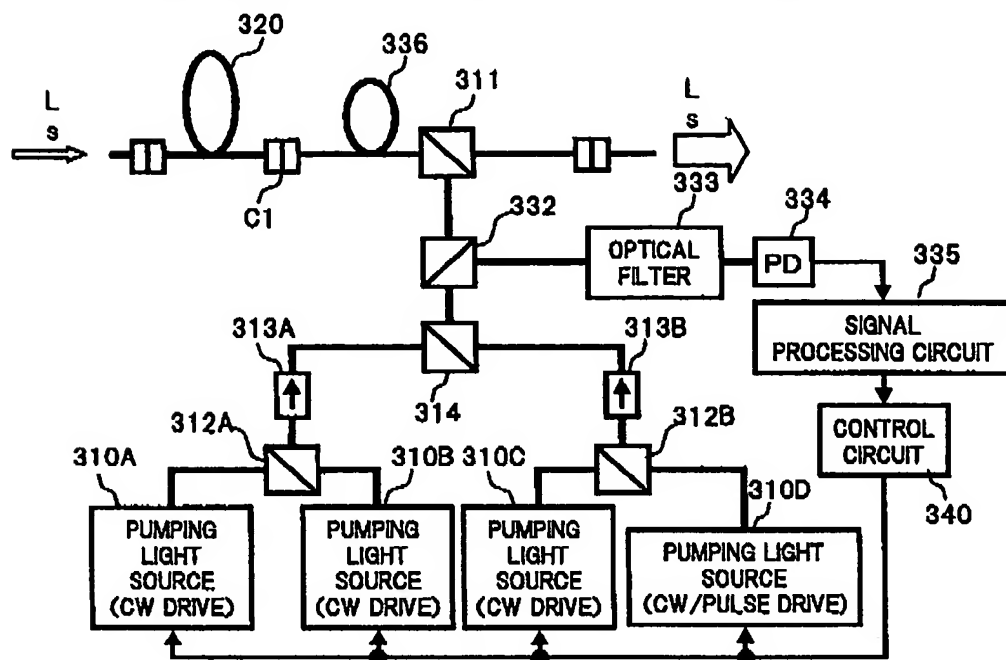


FIG.33

CONFIGURATION OF EMBODIMENT 3-4 OF PRESENT INVENTION

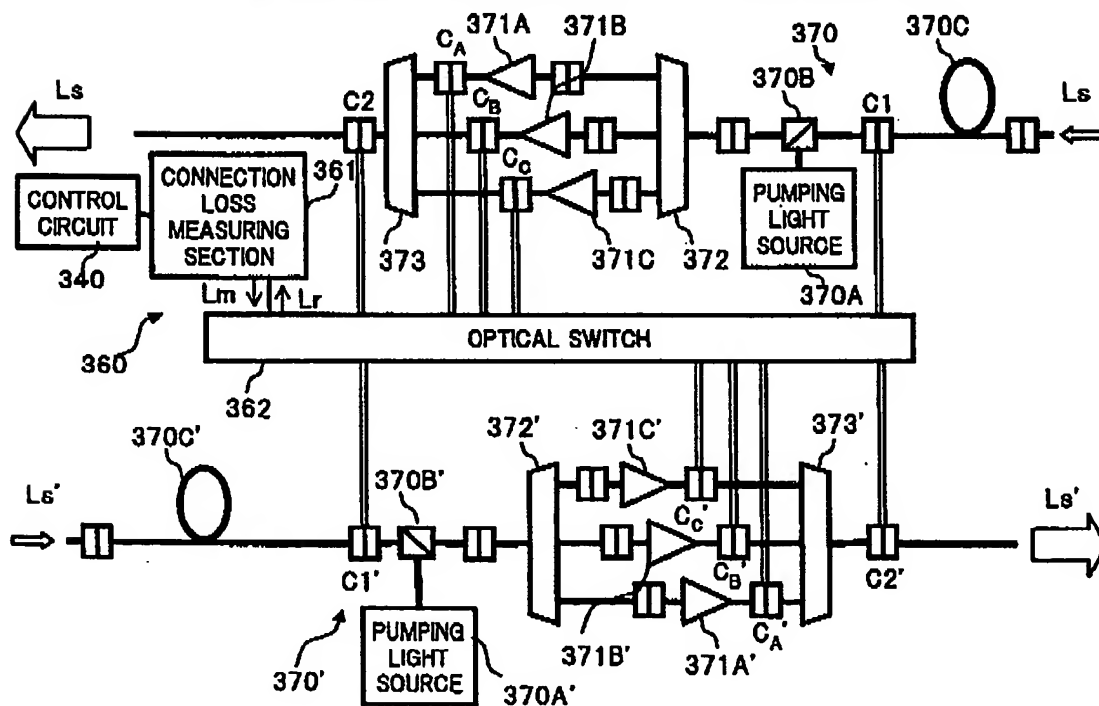


FIG.34

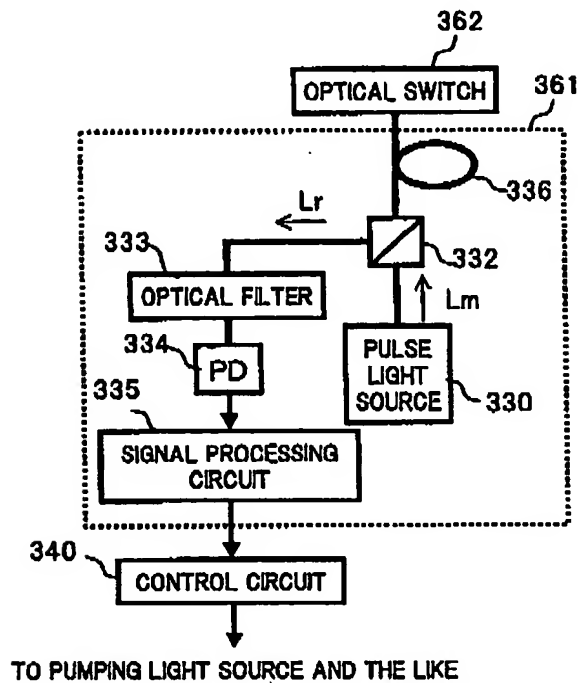


FIG.35

CONFIGURATION OF EMBODIMENT 3-5 OF PRESENT INVENTION

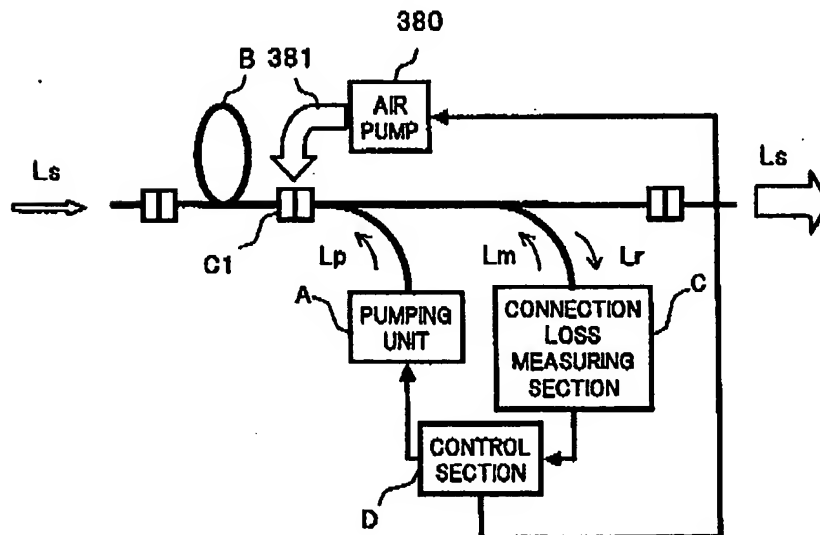


FIG.36

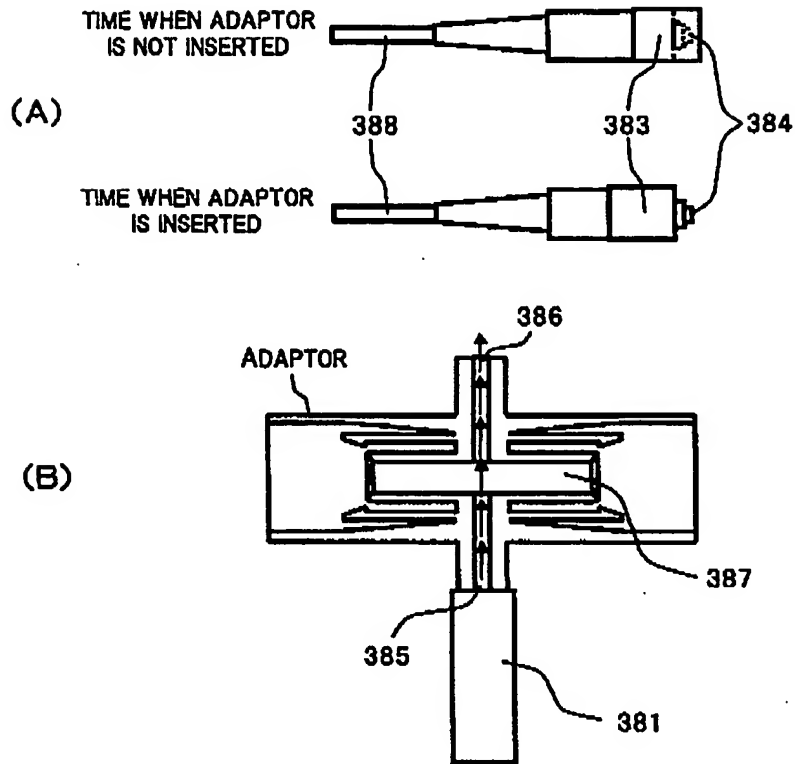


FIG.37

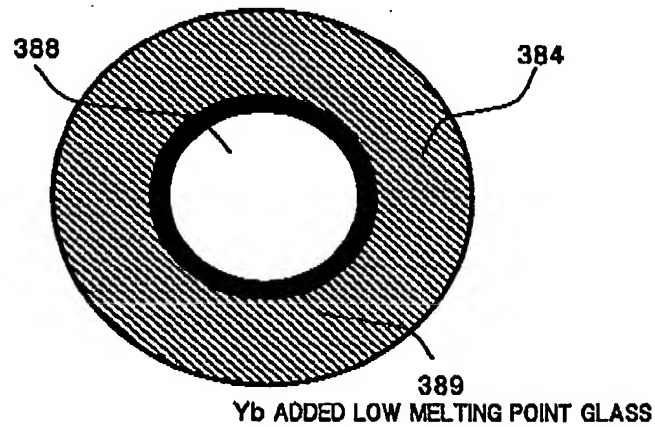


FIG.38

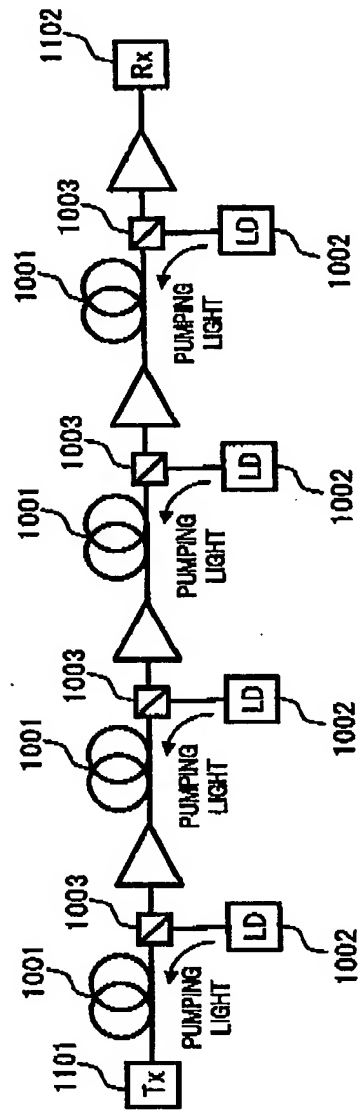
BLOCK DIAGRAM OF OPTICAL TRANSMISSION SYSTEM
USING TYPICAL RAMAN AMPLIFIER

FIG.39

RELATED ART

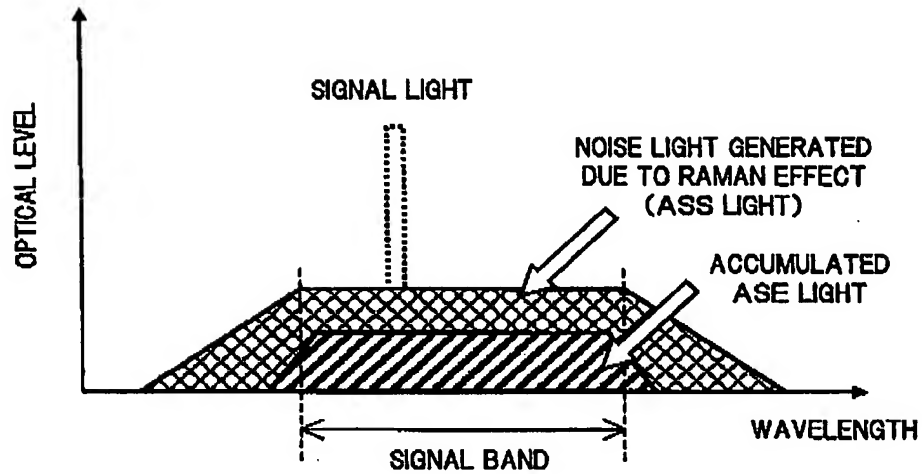


FIG.40

RELATED ART

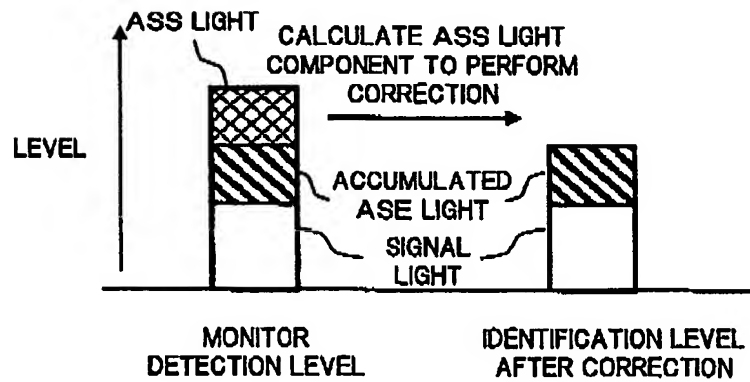


FIG. 41

RELATED ART

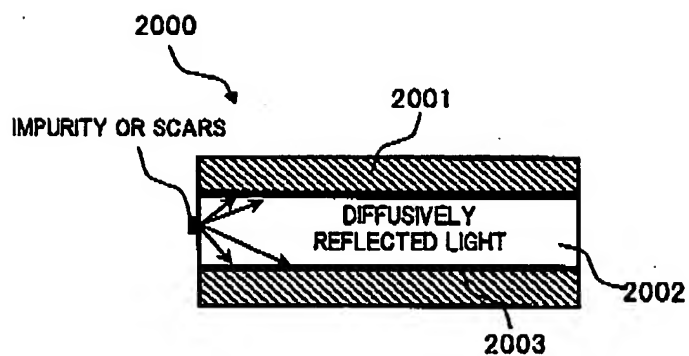


FIG. 42

RELATED ART

